

# Earthquake Warning Issues in Cascadia

National Earthquake Prediction Evaluation Council  
May 18, 2007



## The Seismic Safety Patrol: Communicating Risk & Uncertainty

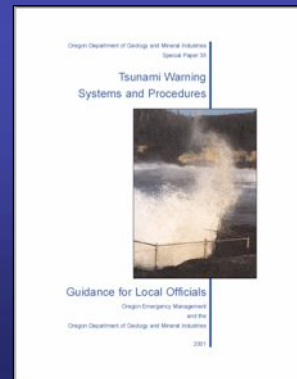


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## Emergency Management Concerns : Tsunami Evacuation

- Black or White basics
  - Strong Earthquake means evacuate for tsunami
  - NWS Tsunami Warning means evacuate
- Then there's the category of "Other"
  - Short Segment Break on CSZ
  - Quake induced submarine landslide
  - Slow earthquake
    - Duration of sustained advisory?
    - Public Complacency over time?
  - Inter-plate Foreshock?



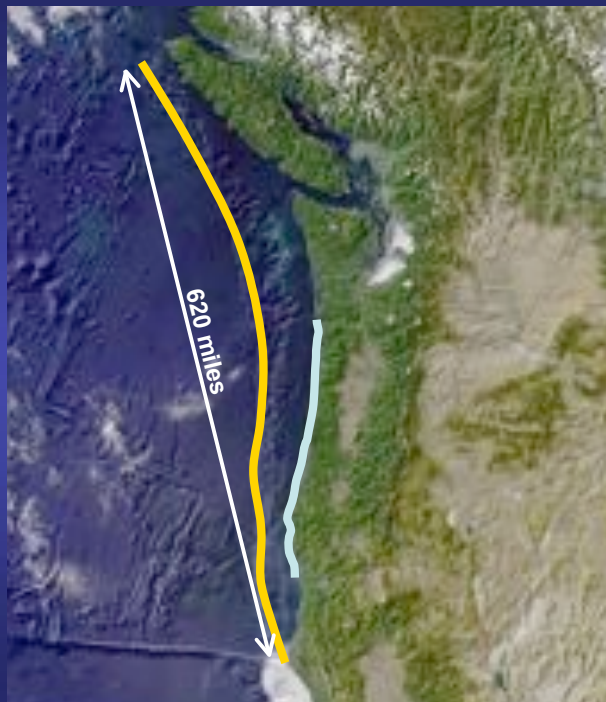
# CASCADIA

Priority is the  
Local Tsunami a  
“Sumatra-Level”  
Hazard

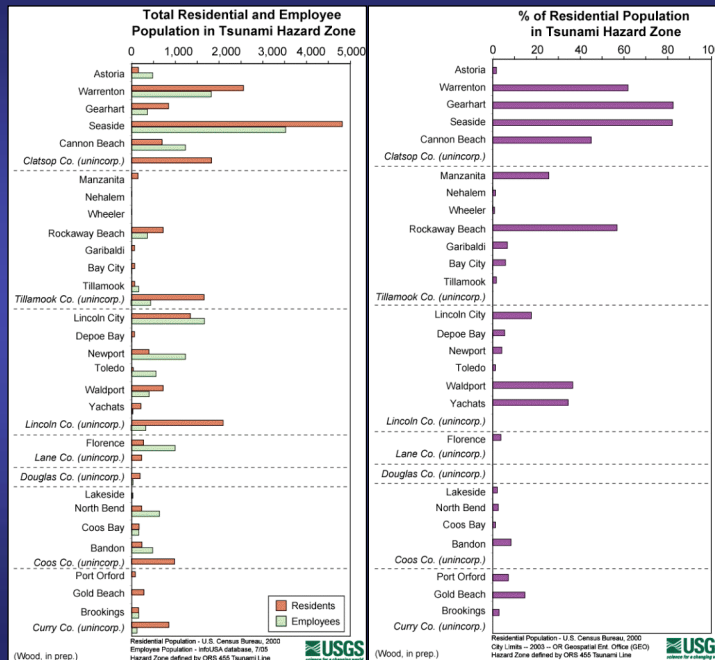
Cascadia  
Subduction  
Zone  
Fault Line  
(gold)

Oregon  
Coastline  
(light blue)

Last Cascadia Event = AD 1700

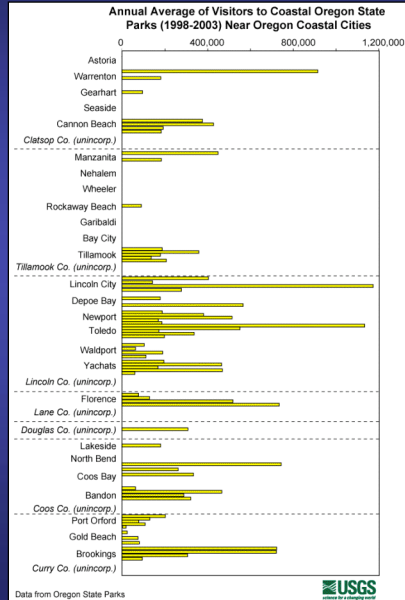
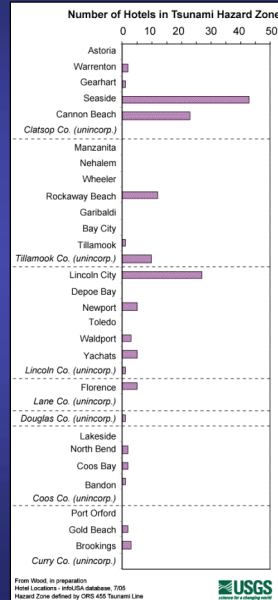


## Which community members are in the tsunami hazard zone?



## How many visitors could be in the disaster zone?

- Libraries
- Shopping centers
- Parks
- Historical places
- Museums
- Theaters
- Casinos
- Amusement parks
- Zoos/Aquariums
- Festivals
- Sporting events
- Houses of worship



## Risk Communication

### Slow earthquake

- What's the expectation of the public, Media, and officials?
- Duration of sustained advisory?
- Public Complacency over time?



## CSZ Inter-plate Foreshock? 8/19/04

- Moderate magnitude seismic events along boundary of CSZ plates
- Adequate seismic instrumentation to understand these events?
- What to tell public regarding potential CSZ activity?

[PNSN](#) > [Catalogs and Data](#) > [Historic Earthquakes](#) > [Recent Notable Earthquakes](#) > Special Event

### Earthquake Report

**Magnitude 4.7, W of Newport, OR**  
**Wednesday August 18, 2004 at 11:06:3.48 PM (PDT)**

#### Magnitude 4.7

Time Thursday August 19, 2004 at 06:06:3.48 Z (UTC)

Wednesday August 18, 2004 at 11:06:3.48 PM (PDT)

Distance from 20.5 km W of Newport, OR  
 95.8 km SSW of Tillamook, OR  
 164.8 km SW of Portland, OR

Coordinates 44.660 deg N  
 124.308 deg W

Depth 28 km

Quality poor (BD)

Note: 1 km = 0.621 mile or 1 mile = 1.61 km

Name of Event File: 040819060600



## CSZ Inter-plate Foreshock? 7/12/04

- Moderate magnitude seismic events along boundary of CSZ plates
- Adequate seismic instrumentation to understand these events?
- What to tell public regarding potential CSZ activity?

[PNSN](#) > [Catalogs and Data](#) > [Historic Earthquakes](#) > [Recent Notable Earthquakes](#) > Special Event

### Earthquake Report

**Magnitude 4.9, SW of Newport, OR**  
**Monday July 12, 2004 at 09:45:0.41 AM (PDT)**

#### Magnitude 4.9

Time Monday July 12, 2004 at 16:45:0.41 Z (UTC)

Monday July 12, 2004 at 09:45:0.41 AM (PDT)

Distance from 50.4 km SW of Newport, OR  
 110.1 km NNW of Coos Bay, OR  
 201.0 km SW of Portland, OR

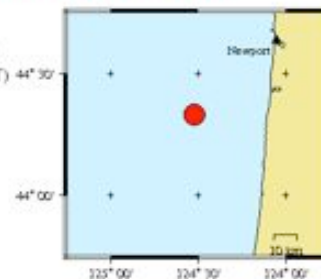
Coordinates 44.332 deg N  
 124.520 deg W

Depth 29 km

Quality poor (CD)

Note: 1 km = 0.621 mile or 1 mile = 1.61 km

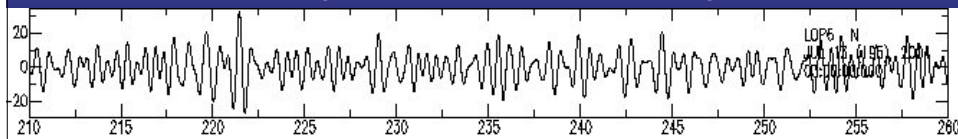
Name of Event File: 040712164500



## Connected to July 2004 ETS?

- July 13, 2004 - Tremor on July 11 and 12 was almost continuous and quite strong during several different periods. Preliminary locations put epicenters just north of the Olympic Peninsula but there is some spread both to the south and north. Preliminary plots of data from our Lopez Array shows very good signal to noise for at least a few of the stronger tremor periods. As of early on July 13 the tremor level seems to have decreased some and become a bit less frequent. The geodesists have been processing GPS data but report that they see no evidence of the ETS yet.
- July 11, 2004 - THE ETS HAS STARTED!!!! There is no question now that this is it. The tremor was fairly weak as of a couple of days ago, but as of today we are seeing some very strong tremor. While we have not done any formal locations, based on the strength of the tremor it would seem that most of it is located in the north-east Olympic Peninsula area. It is strong enough to record quite well over much of western Washington. Our three seismic arrays are working well; however, one station in the Lopez array is down because a haying machine destroyed the cable. We are replacing this cable tomorrow and will check on the other arrays again soon thereafter.
- July 10, 2004 - Tremor has increased over the past couple of days so that it is both stronger and more often. We see it both on stations in the north Puget Sound and also ones in the central Puget Sound. It appears that the sources are both in the north and in the central area at roughly the same time. This may be the ETS.
- July 9, 2004 - **MAIN ETS BEGINS**

<http://www.pnsn.org/WEBICORDER/DEEPTREM/spring2004.html>



## Next Steps

- Improved Instrumentation for CSZ Inter-plate earthquakes?
- Consensus for describing activity?
- Policy for when to advise public of potential for CSZ increase?
- Communication of uncertainty?

